Master of Computer Science (Applied Computing)
Proposed Research Titles
Semester 1, 2024/25

Supervisor Name	Assoc. Prof. Dr. Amirrudin Kamsin
Email	amir@um.edu.my
Research Area	AI/IOT
Research Title	"Smart Health Monitoring System: Leveraging IoT and AI for Real-Time Patient Insights"
Brief Description	This dissertation aims to design and develop a smart health monitoring system that utilizes Internet of Things (IoT) devices and artificial intelligence (AI) to provide real-time insights into patient health metrics. The system will collect data from wearable sensors, process it through AI algorithms, and deliver actionable feedback to both patients and healthcare providers.

Supervisor Name	Assoc. Prof. Dr. Amirrudin Kamsin
Email	amir@um.edu.my
Research Area	Blockchain, Information Security
Research Title	Blockchain for Secure Digital Identity: Enhancing Privacy and Trust in Online Transactions
Brief Description	Description: This dissertation will explore the implementation of blockchain technology to create a secure digital identity framework. The study will focus on developing a decentralized application (dApp) that allows users to manage their digital identities while ensuring privacy and trust in online transactions. Expected Outcomes: • A functioning App that demonstrates secure identity management. • A comparative analysis of traditional versus blockchain-based identity solutions. • Guidelines for stakeholders on adopting blockchain for digital identity verification.

Supervisor Name	Assoc. Prof. Dr. Amirrudin Kamsin
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Research Area	AR, Multimedia, Learning Technology
Research Title	Augmented Reality in Education: A Study on Enhancing Learning Outcomes through Immersive Experiences
Brief Description	Description: This dissertation will investigate the impact of augmented reality (AR) on educational practices by developing an AR application designed for interactive learning experiences. The study will assess how AR can enhance engagement, retention, and comprehension in students. Expected Outcomes: • An AR application tailored for specific educational content. • Empirical data demonstrating the effectiveness of AR in improving learning outcomes. • Insights and recommendations for educators on incorporating AR into curricula.

Supervisor Name	Dr. Asmiza Abdul Sani
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Research Area	Software Framework
Research Title	A Conceptual Framework for Low-Code/No-Code Development of AI-Powered Applications
Brief Description	This research introduces a conceptual framework designed to enable the development of AI-powered applications using low-code/no-code (LC/NC) platforms. The framework focuses on recommending the integration of AI functionalities—such as machine learning models, natural language processing, and predictive analytics—into applications without requiring extensive programming knowledge. By bridging the knowledge gap between AI and software development, this framework aims to assist users, from business professionals to novice developers, to rapidly develop intelligent applications, enhancing productivity and innovation across diverse fields.

Supervisor Name	Dr. Bryan Raj
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Research Area	Wireless Sensor Networks
Research Title	Machine Learning-Based Approaches for Energy Optimization for wearables WSNs
Brief Description	Machine Learning-Based Approaches for Energy Optimization in Wearable Wireless Sensor Networks (WSNs) involve using machine learning (ML) techniques to improve energy efficiency in wearable devices, which typically have limited power sources such as small batteries. In wearable

	WSNs, sensors continuously monitor health metrics, motion, or environmental conditions, transmitting data wirelessly. The constant need for communication and data processing can quickly drain energy. ML-based approaches can help by predicting optimal times for data transmission, reducing redundant communications, and dynamically adjusting sensor operations based on usage patterns or environmental factors. For example, reinforcement learning can enable wearable devices to adapt their energy consumption in real-time, while unsupervised learning can optimize data aggregation and feature selection to minimize energy usage. These methods allow wearable WSNs to function longer without needing frequent recharging, enhancing their usability for health monitoring, fitness tracking, and medical diagnostics. The integration of ML also enables personalized energy management by learning individual user behavior, thus tailoring the system's operation for maximum efficiency. This approach is crucial as wearable technology advances and demands energy-efficient solutions to support long-term, uninterrupted usage.

Supervisor Name	Dr. Burhan Ul Islam Khan
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Research Area	Cybersecurity
Research Title	Design and Deployment of a Zero Trust Model for Secure Enterprise Data Access
Brief Description	The project will involve designing and deploying a robust Zero Trust model tailored to an enterprise environment, ensuring strict authentication and authorization for all data access requests. Key elements include multi-factor authentication (MFA), role-based access controls (RBAC), real-time monitoring, and micro-segmentation of the network. By deploying this model, enterprises can minimize their attack surface, protect against unauthorized access, and safeguard critical data assets from evolving cybersecurity threats. The ultimate goal is to enhance the security, resilience, and trustworthiness of enterprise data access systems, making them more resistant to breaches and cyber-attacks.

Supervisor Name	Prof. Dr. Loo Chu Kiong
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Research Area	Artificial Intelligence

Research Title	Freight Routing Optimization using Machine Learning
Brief Description	The goal of this proposal is to develop a machine learning-based solution to optimize freight routing, which will improve logistics efficiency, reduce operational costs, and minimize environmental impact by reducing fuel consumption and emissions. The proposed system will analyze and predict optimal freight routes, taking into account factors such as traffic patterns, fuel costs, weather conditions, delivery deadlines, and vehicle constraints.

Supervisor Name	Prof. Dr. Loo Chu Kiong
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Research Area	AI
Research Title	Early myocardial infarction detection over multi-view echocardiography
Brief Description	Myocardial infarction (MI) is the world's leading cause of death, and its early detection can help reduce myocardial damage through timely treatment. The earliest indication of MI is the regional wall motion abnormality (RWMA) in ischemic myocardial segments, which can be observed with echocardiography. However, assessing RWMA from a single echocardiographic view may result in missed MI diagnoses, as the abnormality may not be visible in that specific view. To address this, our study proposes combining apical 4-chamber (A4C) and apical 2-chamber (A2C) views, allowing for the analysis of 12 myocardial segments to improve MI detection.

Supervisor Name	Prof. Dr. Loo Chu Kiong
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Research Area	AI
Research Title	Autonomous robotic ultrasound system for thyroid scanning
Brief Description	Thyroid ultrasounds currently depend largely on the sonographer's experience and skill, as well as the radiologist's expertise, making the process both physically and mentally demanding. This paper presents a fully autonomous robotic ultrasound system capable of independently scanning thyroid areas and identifying malignant nodules. The system uses human skeleton point recognition, reinforcement learning, and force feedback to overcome challenges in accurately locating thyroid targets.

Supervisor Name	Assoc. Prof. Dr. Kasturi Dewi Varathan
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Research Area	Social Media Analytics
Research Title	Explainable Depression Detection using Large Language Model
Brief Description	Explainable Depression Detection using Large Language Models: This project focuses on leveraging large language models (LLMs) to detect signs of depression in user-generated text while emphasizing explainability. The goal is not only to accurately identify potential depressive symptoms but also to provide clear, interpretable insights into the model's decision-making process. By incorporating explainability, this project aims to increase trust and transparency in AI systems, ensuring that mental health professionals and users can understand the rationale behind the detected patterns.

Supervisor Name	Assoc. Prof. Dr. Kasturi Dewi Varathan
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Research Area	Text Mining
Research Title	Cyberbullying Detection in Online Social Media
Brief Description	Cyberbullying Detection in Online Social Media Using Psycholinguistic Characteristics: This research aims to develop a robust system for detecting cyberbullying across social media platforms by analyzing psycholinguistic features in user-generated content. The focus will be on identifying harmful behaviors such as harassment, threats, and abusive language using advanced text mining and natural language processing (NLP) techniques. By exploring psycholinguistic traits—such as tone, emotional expression, and cognitive patterns—this research seeks to capture the underlying psychological characteristics that differentiate cyberbullying from regular online interactions. It will also investigate how these patterns manifest across different social media platforms, providing insights for better monitoring and prevention strategies

Supervisor Name	Assoc. Prof. Dr. Kasturi Dewi Varathan
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Research Area	Information Retrieval
Research Title	Medical Diagnostic based on Large Language Model
Brief Description	This research focuses on developing an intelligent medical diagnostic model that leverages large language models (LLMs) to assist healthcare professionals in diagnosing medical conditions. By analyzing patient symptoms, medical history, and relevant literature, the model can provide insights, suggest potential diagnoses, and recommend further tests or treatments. The aim is to enhance decision-making in clinical settings by improving accuracy and efficiency while reducing the cognitive load on healthcare providers.

Supervisor Name	Assoc. Prof. Dr. Mumtaz Begum Mustafa
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Research Area	AI and Speech Processing
Research Title	AI-SMART VOICE ASSISTANT FOR MULTILINGUAL SOCIETIES
Brief Description	Voice assistants listen to specific voice commands (in the form of instruction, or questions) and return relevant information or perform specific functions as requested by the user. While there have been significant developments in monolingual (single language) voice assistants, their ability to recognize multi-lingual voices (many languages) is significantly restricted. This research will develop language a detection model for AI-smart voice assistant in recognizing multiple languages.

Supervisor Name	Mdm. Nornazlita Hussin
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Research Area	Virtual Reality, Augmented Reality, User Engagement
Research Title	User Engagement in Augmented Reality Games Analyzing Behavioral Patterns on TikTok
Brief Description	This research investigates how users interact with AR games on TikTok, focusing on their engagement behaviors and preferences to understand what keeps them involved

Supervisor Name	Mdm. Nornazlita Hussin

Email	nazlita@um.edu.my
Research Area	Augmented Reality
Research Title	Augmented Reality on Student Engagement in STEM Education"
Brief Description	This study examines how the use of AR tools affects student interest and participation in STEM subjects, assessing its potential to make learning more engaging.

Supervisor Name	Mdm. Nornazlita Hussin
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Research Area	Augmented Reality
Research Title	Gamifying Learning by Integrating Augmented Reality into TikTok
Brief Description	This research looks at how to combine AR with TikTok to create educational games, aiming to enhance user engagement and make learning more enjoyable through social media platforms

Supervisor Name	Mdm. Nornazlita Hussin
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Research Area	Augmented Reality
Research Title	Assessing the Effectiveness of Augmented Reality in Teaching History through Interactive Timelines
Brief Description	This study evaluates how AR can bring historical events to life by allowing students to interact with virtual timelines, enhancing their understanding and retention of historical knowledge.

Supervisor Name	Mdm. Nornazlita Hussin
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Research Area	Augmented Reality
Research Title	Evaluating Augmented Reality Educational Content on Social Media Platforms
Brief Description	This study investigates how augmented reality can be utilized in educational content on social media, particularly TikTok, to enhance

	learning experiences. It aims to analyze the effectiveness of AR features in making educational material more engaging and accessible for users.

Supervisor Name	Prof. Dr. Por Lip Yee
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Research Area	Information Security
Research Title	Crime Detection in Social Media Using Natural Language Processing and Machine Learning Techniques
Brief Description	The increasing use of social media platforms has significantly transformed the way individuals communicate and share information. However, these platforms are also frequently exploited for criminal activities such as cyberbullying, hate speech, drug trafficking, fraud, and human trafficking. The immense volume of content generated daily on platforms like Twitter, Facebook, Instagram, and Reddit makes it nearly impossible for manual monitoring and moderation of illegal activities. Therefore, developing an automated system for detecting criminal activities on social media has become critical. This project aims to leverage natural language processing (NLP) and machine learning (ML) techniques to build a crime detection system that can identify illegal content in real-time, enabling timely intervention by authorities and platform moderators. Social media has been misused for various criminal activities that pose significant challenges to online safety. Cyberbullying, for instance, involves harassing or threatening individuals through social platforms, leading to serious emotional and psychological harm. Similarly, hate speech spreads violence and hatred based on race, religion, or gender, while scams and fraud deceive people into financial losses. Platforms such as Instagram and Facebook are also frequently used for illegal drug sales and even human trafficking. As these platforms continue to evolve, so do the methods used by criminals. This project will focus on detecting such illegal activities by analyzing text data from social media, using advanced machine learning and NLP approaches to understand and classify crime-related posts. To detect crimes on social media, large and diverse datasets are required. Several datasets are available for this task, including the Kaggle Twitter Hate Speech Dataset, which contains labeled hate speech and offensive language posts, and a Cyberbullying Dataset from Kaggle, which classifies tweets as bullying or non-bullying. Another dataset includes discussions on Reddit, where criminal activities may be discussed in certain forums. Additionally, the project could utilize a Fake News Detection Dataset to identify fraudulent content on platforms, as well as a Drugs Trafficking Dataset from DarkNet Markets. These datasets will be processed using advanced NLP techniques such as tokenization,

	stemming, lemmatization, and feature extraction methods like Term Frequency-Inverse Document Frequency (TF-IDF) and word embeddings. Once the data is processed, machine learning models will be developed and trained to detect criminal activities. A variety of models will be tested, including Support Vector Machines (SVM), Random Forest, Naive Bayes, and deep learning approaches like Long Short-Term Memory (LSTM) and Bidirectional Encoder Representations from Transformers (BERT). These models will be trained to identify patterns in the text that correspond to criminal behavior, with feature extraction techniques helping to improve accuracy. In addition, sentiment analysis and topic modeling will be used to understand the emotional tone and context of the posts. These methods will help to create a comprehensive system for detecting a range of criminal activities in different social media platforms. Evaluating the performance of the crime detection models is a critical aspect of this project. Several evaluation metrics will be used to assess the accuracy and reliability of the models, including accuracy, precision, recall, F1-score, and Area Under the Curve (AUC). Precision will measure how well the system can identify relevant crime-related posts, while recall will evaluate how comprehensively it can capture all instances of crime. The F1-score will provide a balanced view of both precision and recall. Additionally, a confusion matrix will be used to visualize the number of correct and incorrect classifications. These metrics will help ensure that the system is robust, accurate, and capable of effectively identi

Supervisor Name	Dr. Su Moon Ting
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Research Area	Machine Learning and Software Design
Research Title	An LLM-based teaching assistant for teaching software design
Brief Description	Software design is a critical part of the software development process. It covers the activities and decisions involved in the creation of a software system, ranging from software architecture design to code design. Due to the vast materials on software design that must be covered, a virtual teaching assistant for teaching software design would be beneficial for those teaching software design. Currently, there is no virtual teaching assistant that leverages large-language models for teaching software design. To address this gap, the overall aim of this research is to produce a framework for designing and implementing an LLM-based virtual teaching assistant for teaching software design.

Supervisor Name	Dr. Suzan Jabbar Obaiys
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Research Area	Cybersecurity
Research Title	Advancements in multimodal low-light image enhancement techniques for multimedia contents
Brief Description	The purpose of this study is to understand the theoretical framework of multimodal to improve low-light photos by calculating illumination maps, which are subsequently applied to modify the image's contrast and brightness. The Retinex theory, which holds that a picture may be broken down into components for illumination and reflectance, is the central idea of this approach. This theory is used by the LIME model to distinguish between illumination and reflectance, enabling focused improvement of the low-light regions. Candidate/s need to apply the multimodal low-light image enhancement using programming language.

Supervisor Name	Dr. Suzan Jabbar Obaiys
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Research Area	Cybersecurity
Research Title	Weather Prediction Model Using Random Forest Classifier
Brief Description	Traditional forecasting methods often rely on complex numerical models, which require extensive computational resources and domain expertise. In recent years, the advent of ML techniques has provided a promising alternative for weather prediction, leveraging historical data to uncover patterns and make accurate forecasts. Among these ML approaches, the Random Forest algorithm has emerged as a powerful tool due to its ability to handle large datasets, mitigate overfitting, and deliver high prediction accuracy. This study focuses on developing a weather prediction model using the Random Forest classifier and evaluates its performance using historical weather data.